M3D-C1 Postprocessing for LP Ablation Code

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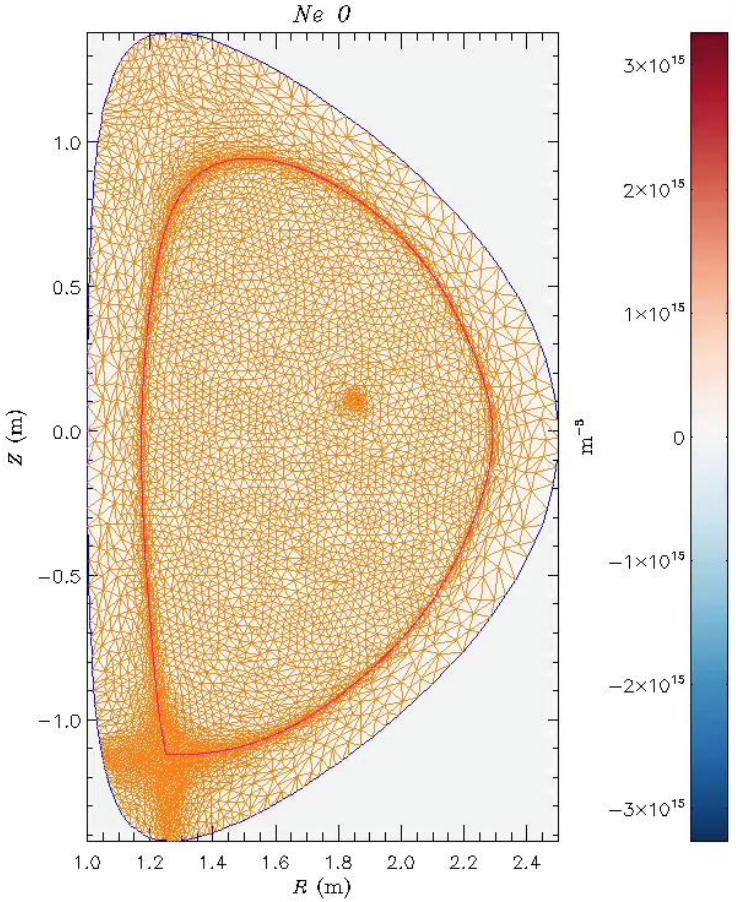
October 20th, 2020

GENERAL ATOMICS

LP Ablation Code Takes Needs Only Scalar Plasma Quantities

- **LP code takes far-field plasma parameters as boundary conditions**
  - n_e, T_e, and $|B|$
  - Density & temperature should be outside the ablation cloud ($|B|$ too?)
- **We elected to do get these quantities in post-processing from the M3D-C1 .h5 files**
  - Allows for easy experimentation on correct evaluation procedure
  - Once finalized, could be hard-coded for higher time-resolution output in M3D-C1



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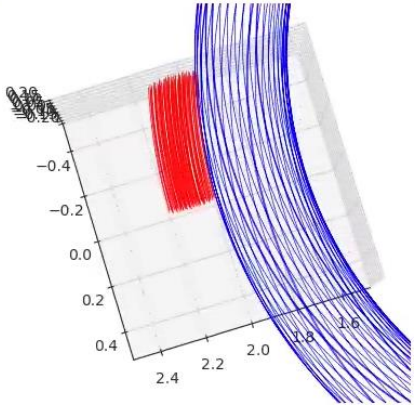
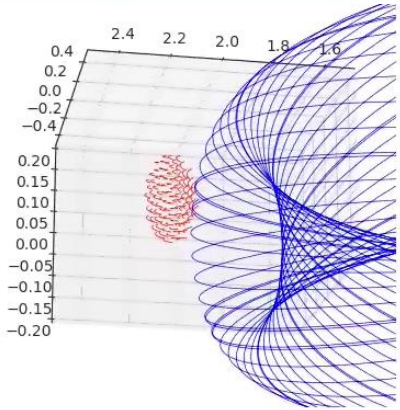
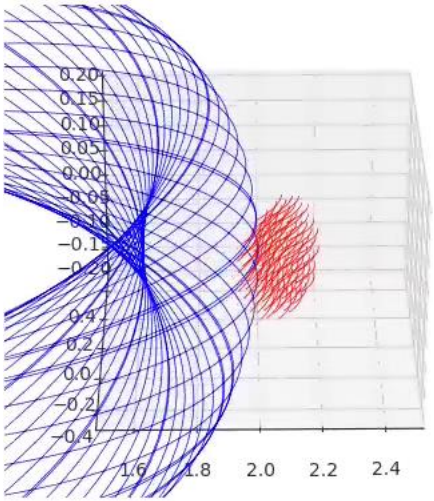
New Script Created to Postprocess These Quantities

- `write_lp_input`
  - Based on and included within `fusion-io` library
  - Traces along field line from starting location in both directions (with B and against B)
  - Evaluates n_e, T_e, and |B| at the end points and averages
  - Can start with collection of points in some poloidal radius around starting point to average that too
- **By default, reads pellet location at a slice as the starting point**
- **Can be set to do this for all slices**
- **Important output to stdout**
  - Line of R, phi, Z, ne, Te, |B| for each slice
  - Can be redirected to file for easy reading







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How to use

Command line

- `write_lp_input <file> <slice> <ipellet>`
- `<file>` is the C1.h5 filename (default C1.h5)
- `<slice>` is the number of the time_###.h5 you want (default 0)
- `<ipellet>` is the number of the pellet you want, if there are multiple (default 0)

Fortran Namelist (write_lp.nml)

```
&params
  R0 = 2.1
  phi0 = 0.0
  Z0 = 0.0
  L = 0.5
  Nstep = 100
  rpol = 0.1
  Npol = 100
  iall_slices = 0
  iprint = 0
  ioutput_fl = 1
/
```

```
! Optional namelist variables
! slice & ipellet can be included and will override command line input
real :: R0, phi0, Z0   ! position to analyze from (default to pellet location)
real :: L              ! length to traverse along field line before eval
integer :: Nstep       ! number of steps along field line
real :: rpol           ! radius for averaging in poloidal plane
integer :: Npol        ! number of points to average in poloidal plane
integer :: iall_slices ! 1: get all slices from 0 to slice
integer :: iprint      ! 1: print debug statements to standard error
integer :: ioutput_fl  ! (+/-)1: output path of (positive/negative) field line
```

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